

IN THE CLAIMS:

The following is a complete listing of the claims, reflects all changes currently being made thereto, and replaces all earlier versions and listings.

1. - 5. (Canceled)

6. (Currently Amended) An electron-emitting device comprising:

a cathode electrode; and

a layer connected to the cathode electrode, wherein

a plurality of groups of particles, each group being constituted by at least two particles which comprise metal as a main component and are adjacent to each other, are discretely arranged apart from each other by a distance equal to an average film thickness of the layer or more in at least a surface and surface vicinity region of the layer, wherein the surface and surface vicinity region between the groups contain substantially no metal.

the layer comprises as a main component a material which has resistivity higher than resistivity of the particles,

the adjacent two particles are distinct crystalline particulates arranged to be separated from others in a range of 5 nm or less, or to be just in contact with another, and

the size of the adjacent two particle in diameter are smaller than the average film thickness of the layer and one of the adjacent two particles is arranged to be nearer to the cathode electrode than the other particle.

7. - 46. (Canceled)

47. (Previously Presented) An electron-emitting device according to claim 6, wherein

the plurality of groups of particles are arranged apart from each other by a distance equal to an average film thickness of the layer or more.

48. (Previously Presented) An electron-emitting device according to claim 47, wherein a density of the particles in the layer is 1×10^{14} particles/cm³ or more and 5×10^{18} particles/cm³ or less.

49. (Previously Presented) An electron-emitting device according to claim 48, wherein

a concentration of a main element of the particles with respect to a main element of the layer is 0.001 atm% or more and 1.5 atm% or less.

50. (Previously Presented) An electron-emitting device according to claim 47, wherein:

the layer comprises carbon as a main component; and
the particles comprises metal as a main component, and
the layer contains a hydrogen of 0.1 atm% or more and 20 atm% or less with respect to a carbon element.

51. (Previously Presented) An electron-emitting device according to claim 50, wherein the metal is selected from the group consisting of Co, Ni, and Fe.

52. (Previously Presented) An electron-emitting device according to claim 47, wherein

graphene is included between adjacent particles among at least part of the plurality of particles.

53. (Previously Presented) An electron-emitting device according to claim 48, wherein surface unevenness of the layer is smaller than 1/10 of its film thickness in rms.

54. (Previously Presented) An electron-emitting device according to claim 51, wherein the layer comprising carbon as a main component has an sp^3 bonding.

55. (Previously Presented) An electron-emitting device according to claim 48, wherein the particles comprise monocrystalline metal as a main component.

56. (Previously Presented) An electron-emitting device according to claim 48, wherein the particles have an average particle diameter of 1 nm or more to 10 nm or less.

57. (Previously Presented) An electron-emitting device according to claim 48, wherein the layer has a thickness of 100 nm or less.

58. (Previously Presented) An electron-emitting device according to claim 48, wherein a density of the particles in the layer is 1×10^{15} particles / cm^3 or more and 5×10^{17} particles / cm^3 or less.

59. (Previously Presented) An electron-emitting device according to claim 48, wherein a concentration of a main element of the particles with respect to a main element of the layer is 0.05 atm% or more and 1 atm% or less.

60. (Previously Presented) An electron-emitting device according to claim 48, wherein the surface of the layer is terminated with hydrogen.

61. (Previously Presented) An electron-emitting device according to claim 47, further comprising:

an insulating film which is arranged on the cathode electrode and has a first opening; and

a gate electrode which is arranged on the insulating film and has a second opening, wherein

the first opening and the second opening communicate with each other, and

the layer is exposed in the first opening.

62. (Previously Presented) An electron source, wherein a plurality of the electron-emitting devices according to claim 47 are arranged.

63. (Previously Presented) An image display apparatus, characterized by comprising the electron source according to claim 62 and a light-emitting member which emits light by being irradiated with electrons.